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10/713,017	11/17/2003	Wong Shaw Voon	WONG3019/JEK	9735

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EXAMINER	
BUSS, BENJAMIN J	
ART UNIT	**PAPER NUMBER**
2129	

DATE MAILED: 02/01/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/713,017	VOON ET AL.	
	Examiner	Art Unit	
	Benjamin J. Buss	2129	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7* is/are rejected.

7)☒ Claim(s) *8* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Examiner respectfully requests that Applicant ensures that the claims and specification are written clearly in grammatically correct English to enable proper examination.

Information Disclosure Statement

No Information Disclosure Statement (IDS) has been filed with this application. Applicant is reminded of the duty of all individuals associated with the filing or prosecution of a patent application to disclose all information known to be material to patentability. This duty to disclose extend to each inventor named, each agent or attorney involved, and every other person involved who is associated with the inventor, assignee, or anyone to whom there is an obligation to assign the application. See 37 CFR 1.56 and MPEP Chapter 2000 for more information.

Specification

35 U.S.C. 112, first paragraph, requires the specification to be written in "full, clear, concise, and exact terms." The specification is replete with terms/phrases which are not clear, concise and exact. The specification should be revised carefully in order to comply with 35 U.S.C. 112, first paragraph. Examples of some unclear, inexact or verbose terms/phrases used in the specification are:

Page 1 L14: "Machinability data is never defined **preciously** in a scientific way." Examiner suspects that Applicant intended to use -- **precisely** --.

Page 3 L4: "The present invention comprises **of the** three main embodiments." Examiner suggests that "of the" be deleted from this sentence.

In the same vein, Examiner further requests Applicant to ensure that there are no spaces in the middle of words. The issue is found throughout the instant application. As an example, underscore characters are used here to represent ***extraneous*** spaces seen in the identified lines of the specification:

Page 1 L28: "The general practice o_f e_xperienced m_achinists i_s captured, f_ormalized and made"

Page 3 L17: "outputs i_n r_espective form d_epending on t_he AI model i_ncorperated. T_he y_ielded"

Appropriate corrections are required.

Claim Objections

1. Claims 1, 3-4, and 6 are objected to because of the following informalities:

a. Claim 1 uses "effecting" when -- affecting -- would be the proper term.

b. Claim 3 states "genetic algorithm means for operating said input data" when -- genetic algorithm means for operating **on** said input data -- might more clearly convey the intended limitation.

c. Claim 3 states "means of choosing ***for*** the optimum population member" when -- means of choosing the optimum population member -- might more clearly convey the intended limitation.

d. Claim 4 states "said input data includes ***of*** tool characteristics" when -- said input data includes tool characteristics -- might more clearly convey the intended limitation.

e. Claim 6 states "said output includes ***of*** machining conditions" when -- said output includes machining conditions -- would more clearly convey the intended limitation.

f. Appropriate correction is required.

2. Claim 8 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n). Accordingly, the claim has not been further treated on the merits.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. The claims are generally indefinite, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors. Some examples:

g. Claims 1-2 are indefinite because the meaning of the following phrase is not clear: "input data of a workpiece". Examiner suggests the intended meaning of the phrase *may* be accurately conveyed by -- input data pertaining to a workpiece --.

h. Claims 1-2 are indefinite because the limitation "means of conveying the outputs in analog and/or digital form to the machining environment as the output component" does not make sense. Examiner suggests that the limitation *may* mean one of the following:

i. -- An output component containing means for conveying the outputs in analog and/or digital form to the machining environment --

ii. -- Means for conveying the outputs to an output receiving component of the machining environment in analog and/or digital form --.

i. Claim 1 is indefinite because the limitation "means of fuzzifications of said input data as input component" does not make sense. Examiner suggests that the limitation *may* mean one of the following:

iii. -- An input component containing means for fuzzification of said input data --

iv. -- Means for fuzzification of said input data into a usable input component --.

j. Claim 1 is indefinite because the limitation "fuzzy control means for effecting the inferencing fuzzy rules with a set of predefined fuzzy rules as inference component" does not make sense. Examiner suggests that the limitation *may* mean one of the following:

v. -- An inference component containing fuzzy control means for affecting the fuzzy rules inference with a set of predefined fuzzy rules --

vi. -- Fuzzy control means for affecting a fuzzy inference with a set of predefined fuzzy rules used by an inference component --.

vii. -- Fuzzy control means for using a set of predefined fuzzy rules to cause an effect in the fuzzy inference of an inference component --.

k. Claim 2 is indefinite because the limitation "a neural network for manipulating the multilayer neural network as inference component" does not make sense. Examiner suggests that the limitation *may* mean one of the following:

viii. -- An inference component containing a neural network for manipulating another multilayer neural network --

ix. -- A multilayer neural network component capable of manipulative inference --

x. -- An inference component containing a multilayer neural network capable of manipulating itself --

xi. -- A multilayer neural network inference component capable of manipulation --.

l. Claim 3 is indefinite because the limitation "means operative in response to a plurality of input data of a workpiece for initialization" does not make sense. Examiner suggests that the limitation *may* mean one of the following:

xii. -- Means for initializing a workpiece in response to a plurality of input data --

xiii. -- Means for initializing, in response to input data pertaining to a workpiece, a population of members for use by a genetic algorithm --.

4. Claims 1-3, 6, and 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

m. Claim 1 recites the limitation "the inferencing fuzzy rules" in line 5. There is insufficient antecedent basis for this limitation in the claim.

n. Claim 1 recites the limitation "the yielded output" in line 7. There is insufficient antecedent basis for this limitation in the claim.

o. Claim 1 recites the limitation "the outputs" in line 8. There is insufficient antecedent basis for this limitation in the claim.

p. Claim 1 recites the limitation "the machining environment" in lines 8-9. There is insufficient antecedent basis for this limitation in the claim.

q. Claim 1 recites the limitation "the output component" in line 9. There is insufficient antecedent basis for this limitation in the claim.

r. Claim 2 recites the limitation "the multilayer neural network" in line 5. There is insufficient antecedent basis for this limitation in the claim.

s. Claim 2 recites the limitation "the yielded output" in line 6. There is insufficient antecedent basis for this limitation in the claim.

t. Claim 2 recites the limitation "the outputs" in line 7. There is insufficient antecedent basis for this limitation in the claim.

u. Claim 2 recites the limitation "the machining environment" in lines 7-8. There is insufficient antecedent basis for this limitation in the claim.

v. Claim 2 recites the limitation "the output component" in line 8. There is insufficient antecedent basis for this limitation in the claim.

w. Claim 3 recites the limitation "the yielded output" in line 5. There is insufficient antecedent basis for this limitation in the claim.

x. Claim 3 recites the limitation "the optimum population member" in line 6. There is insufficient antecedent basis for this limitation in the claim.

y. Claim 6 recites the limitation "said output" in line 2. There is insufficient antecedent basis for this limitation in the claim.

z. Claim 8 recites the limitation "said output" in line 2. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 101

35 U.S.C. 101 reads as follows:

> Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

Claim 3 is rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter. No post solution activity or tangible result has been claimed. The claim is considered to be merely the manipulation of abstract data. Therefore, the claimed invention is directed to non-statutory subject matter. Examiner recommends claiming a useful, concrete, and tangible result of the invention to overcome this outstanding 35 U.S.C. §101 rejection.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Polidoro (USPN 5,768,137).

CLAIM 1:

As per claim 1, Polidoro discloses:

Means operative in response to input data of a workpiece (C 2-12 especially "processing input from the imaging system and the laser alignment system" C 12 L 25-30 and "laser aligned remachining of the present invention incorporates parallel platform technology for tool motion and intelligent control" C 2 L 45-60 and "controller is based on linear control algorithms, supplemented by fuzzy logic for intelligence" C 3 L 15-35; *Examiner notes that it is clear that the imaging system and the laser alignment system obtain data on the workpiece to be machined to allow for intelligent positioning of the tool*);

Means of fuzzifications of said input data as input component (C 8-12 especially "The input to the FLC 50 is processed by the fuzzification interface 57, converting the input to the fuzzy set domain" C 9 L 55-C 10 L 5);

Fuzzy control means for effecting the inferencing fuzzy rules with a set of predefined fuzzy rules as inference component (C 8-12 especially "FIG. 16 is an illustration of a Fuzzy Logic Controller (FLC) 50" C 9 L 55-C 10 L 5 and "knowledge base 59 and decision making logic 61 that comprise the inference engine 63" C 9 L 55-C 10 L 5 and "The domain is processed by the fuzzy inference engine 63" C 9 L 55-C10 L 5; See Figure 16);

Means of defuzzification of the yielded output (C 8-12 especially "output is in turn defuzzified" C 9 L 55-C 10 L 5 and "defuzzification system interface 65" C 9 L 55-C 10 L 5; "DEFUZZIFICATION" in Figure 16); and

Means of conveying the outputs in analog and/or digital form to the machining environment as the output component (C 8-12 especially "The output is defuzzified, or converted back into a number in the real domain that is used as the control input to the process 67" C 9 L 55-C 10 L 5).

CLAIM 6:

As per claim 6, Polidoro discloses wherein said output includes machining conditions (C 2-12 especially "The expert unit is used by the milling class and consists of fuzzy logic algorithms to reduce chatter during machining and to select feed rates and spindle speeds" C 9 L 5-35; *Examiner interprets feed rates and spindle speeds to be the machining conditions determined by the fuzzy logic inference*).

CLAIM 7:

As per claim 7, Polidoro discloses wherein said machining conditions are cutting speed and feed rate (C 2-12 especially "The expert unit is used by the milling class and consists of fuzzy logic algorithms to reduce chatter during machining and to select feed rates and spindle speeds" C 9 L 5-35; *Examiner interprets the spindle speed to be the cutting speed of a rotary tool*).

Claim Rejections - 35 USC § 102

Claims 2 and 6-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Balic (US Patent Application Publication No 2003/0187624).

CLAIM 2:

As per claim 2, Balic discloses:

Means operative in response to input data of a workpiece (¶19-53 especially "The model is then transmitted to the NN device 7, which identifies and classifies the individual geometric and technological features 25 of the CAD part model" ¶29 and "On the input layer 43, the X-Y-Z sets 42 of coordinate points appear, representing the coordinate point values obtained from the modified CAD model 26" ¶24; See Figures 2 and 4); *Examiner notes that the CAD model consists of data on a workpiece and its geometry.*

Means of input data manipulation of said input data as input neurons (¶19-53 especially "On the input layer 43, the X-Y-Z sets 42 of coordinate points appear, representing the coordinate point values obtained from the modified CAD model 26" ¶24; See Figure 4);

A neural network for manipulating the multilayer neural network as inference component (¶19-53 especially "The neural network built-in in the NN device 7 consists of three layers: the input layer 43, the hidden layer 44 and the output layer 45" ¶24; See Figure 4);

Means of manipulating the yielded output (¶19-53 especially "output of the NN milling module 27 is the NC control program 28 for the processed part, which includes the geometric data about the mode of cutting tool path" ¶30 and "The data is then transmitted to internal interface 9, which splits the data in the NC control program into tool path data" ¶31; Also see Figure 1); and

Means of conveying the outputs in analog and/or digital form to the machining environment as the output component (¶19-53 especially "output of the NN milling module 27 is the NC control program 28 for the processed part, which includes the geometric data about the mode of cutting tool path" ¶30 and "The data is then transmitted to internal interface 9, which splits the data in the NC control program into tool path data" ¶31 and "The NC functions program 14, which contains the technological data, is transmitted through adaptable interface 19 to the NC machine 3" ¶32; Also see Figure 1).

CLAIM 6:

As per claim 6, Balic discloses wherein said output includes machining conditions (¶19-53 especially "The output of the NN milling module 27 is the NC control program 28 for the processed part, which includes the geometric data about the mode of cutting tool path (linear G01 or circular G02/G03 interpolation), the coordinates of the cutting tool path (e.g. milling cutter), the technological data (revolution speed, feed-rate, depth of cutting) and auxiliary data (coordinates of reference, zero and starting points, direction of rotation of the main spindle M02/M03, change of cutting tools M06, etc.)" ¶30).

CLAIM 7:

As per claim 7, Balic discloses wherein said machining conditions are cutting speed and feed rate (¶19-53 especially "the most suitable machining operations and cutting parameters (cutting speed, feed-rate and depth of cutting) with respect to chosen conditions (machining time, surface quality, machining costs) are defined" ¶29 and "The output of the NN milling module 27 is the NC control program 28 for the processed part, which includes the geometric data about the mode of cutting tool path (linear G01 or circular G02/G03 interpolation), the coordinates of the cutting tool path (e.g. milling cutter), the technological data (revolution speed, feed-rate, depth of cutting) and auxiliary data (coordinates of reference, zero and starting points, direction of rotation of the main spindle M02/M03, change of cutting tools M06, etc.)" ¶30).

Claim Rejections - 35 USC § 102

Claims 3 and 6-7 are rejected under 35 U.S.C. 102(b) as being anticipated by Dereli ("Optimisation of process planning functions by genetic algorithms").

CLAIM 3:

As per claim 3, Dereli discloses:

Means operative in response to a plurality of input data of a workpiece for initialization (pages 281-307 especially "interfacing CAD to CAPP: feature recognition" §1 on page 282 and "Feature sequencing is performed using a GA to find an optimal sequence which is the one that has the least total penalty or largest total reward. It takes the list of features and then generates an initial population of sequences." §4 on page 286 and "The approach we adopt is based on a GA in which the initial population is fed with closed-end alternative solutions obtained by *brach&bound* methodology" §4.1 on page 288);

A genetic algorithm means for operating said input data to produce new members (pages 281-307 especially "genetic operators" §3 and "Genetic operators are used in the generation of the new sequences" §4 on page 286 and "New sequences can be generated by using the genetic operators in difference combination of generation cycles" §4.1 on page 289 and "New chromosomes of cutting tools are generated from the initial population (parents) by using the genetic operators" §5 on pages 296 and "New chromosomes of feed-rate and cutting speed are generated from the initial population by using the genetic operators" §6.4 on page 302; Also see "NEW POPULATION" in Figure 1);

Means of manipulating the yielded output (pages 281-307 especially "interfacing CAPP to CAM: CNC code generation" §1 on page 282; Also see "PRINT RESULTS" in Figure 1); and

Means of choosing for the optimum population member (pages 281-307 especially "the better sequences with the least fitness values dominate in the population and the system eventually converges to an optimal solution" §4.1 on page 293 and "the GA finds optimal solutions" §4.1 on page 293 and "fitness functions to measure the goodness of the chromosomes" §6.4 on page 302; Also see "OPTIMAL SEQUENCE BASED ON THE MINIMUM FITNESS VALUE" in Figure 1).

CLAIM 6:

As per claim 6, Dereli discloses wherein said output includes machining conditions (pages 281-307 especially "New chromosomes of feed-rate and cutting speed are generated from the initial population by using the genetic operators" §6.4 on page 302 and "GA converges to an optimal set of cutting parameters" §6.4 on page 302).

CLAIM 7:

As per claim 7, Dereli discloses wherein said machining conditions are cutting speed and feed rate (pages 281-307 especially "New chromosomes of feed-rate and cutting speed are generated from the initial population by using the genetic operators" §6.4 on page 302 and "GA converges to an optimal set of cutting parameters" §6.4 on page 302).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 4-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Polidoro (USPN 5,768,137) as applied to claims 1 and 6-7 above, and further in view of Fainstein (USPN 6,476,575).

CLAIM 4:

As per claim 4, Polidoro fails to disclose wherein said input data includes tool characteristics, workpiece characteristics, and machining conditions.

Fainstein discloses wherein said input data includes tool characteristics (C 1-5 especially "type of the cutting tool" C 1 L 15-30), workpiece characteristics (C 1-5 especially "diameter of the workpiece, material of the workpiece to be machined" C 1 L 15-30), and machining conditions (C 1-5 especially "cutting conditions such as depth of cut" C 1 L 15-30 and "feed rate and selected speed are controlled input parameters" C 1 L 15-30).

Polidoro and Fainstein are analogous art because they are from the same field of endeavor, CNC machining.

At the time of the invention, it would have been obvious to the person of ordinary skill in the art to use input data including tool characteristics, workpiece characteristics, and machining conditions disclosed by Fainstein in the fuzzy inference CNC machining apparatus of Polidoro.

Motivation for doing so would have been for the "adjustment of the cutting tool's feed rate as a function of a measured cutting torque developed by the machine tool, to compensate for the changes in cutting conditions" (Fainstein, C 1 L 27-50). *Examiner notes that the stated incapability of CNC programs at the time "to take into account unpredictable real-time changes of some of the cutting conditions, namely the changes of the depth of cut, non-uniformity of a workpiece material, tool wear, etc." (Fainstein,*

C 1 L 27-50) would have motivated the person of ordinary skill in the art to treat more of these inputs as variable which had been treated as fixed constants in the past.

Therefore it would have been obvious at the time of the invention to use input data including tool characteristics, workpiece characteristics, and machining conditions disclosed by Fainstein in the fuzzy inference CNC machining apparatus of Polidoro for the benefit of compensating for changes in cutting conditions.

CLAIM 5:

As per claim 5, Polidoro fails to disclose wherein said tool characteristics, workpiece characteristics, and machining conditions are cutting speed, feed rate, hardness of said workpiece, tool materials, and depth of cut.

Fainstein discloses wherein said tool characteristics, workpiece characteristics, and machining conditions are cutting speed (C 1-5 especially "selected speed" C 1 L 15-30), feed rate (C 1-5 especially "feed rate" C 1 L 15-30), hardness of said workpiece (C 1-5 especially "material of the workpiece to be machined" C 1 L 15-30), tool materials (C 1-5 especially "type of the cutting tool" C 1 L 15-30), and depth of cut (C 1-5 especially "depth of cut" C 1 L 15-30). *Examiner notes that the "selected speed" is clearly the cutting speed, that the hardness of a workpiece is clearly indicated by the" material of the workpiece", and a relevant description of the "type of cutting tool" would include the tool materials.*

At the time of the invention, it would have been obvious to the person of ordinary skill in the art to use input data including tool characteristics, workpiece characteristics, and machining conditions including cutting speed, feed rate, hardness of said workpiece, tool materials, and depth of cut as disclosed by Fainstein in the fuzzy inference CNC machining apparatus of Polidoro.

Motivation for doing so would have been for the "adjustment of the cutting tool's feed rate as a function of a measured cutting torque developed by the machine tool, to compensate for the changes in cutting conditions" (Fainstein, C 1 L 27-50). *Examiner notes that the stated incapability of CNC programs at the time "to take into account unpredictable real-time changes of some of the cutting conditions, namely the changes of the depth of cut, non-uniformity of a workpiece material, tool wear, etc." (Fainstein,*

C 1 L 27-50) would have motivated the person of ordinary skill in the art to treat more of these inputs as variable which had been treated as fixed constants in the past.

Therefore it would have been obvious at the time of the invention to use input data including tool characteristics, workpiece characteristics, and machining conditions which are cutting speed, feed rate, hardness of said workpiece, tool materials, and depth of cut as disclosed by Fainstein in the fuzzy inference CNC machining apparatus of Polidoro for the benefit of compensating for changes in cutting conditions.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Wayne (USPN 5,377,116) is directed to designing a cutting tool using a neural network. The tool may be used for cutting, turning, milling, or drilling and the design may be based on workpiece hardness, cutting parameters (depth of cut, speed, feed, and tool orientation), and material properties.

Unno (USPN 5,473,532) is directed to using a neural network for calculating machining conditions on the basis of attribute data on a workpiece. The feed rate of the tool is controlled by a fuzzy inference on the basis of the machining circumstance data.

Kinsman (USPN 5,517,420) is directed to real-time control of laser processing of materials using a fuzzy inference engine including explicit fuzzification of system inputs and defuzzification of system outputs.

Niwa (USPN 5,493,502; USPN 5,532,932; USPN 5,598,512) discloses a fuzzy inference for determining instructions for a numerical control unit used for turning, cutting, or milling based on rules established based on the material of the tool or workpiece.

Pryor (USPN 5,917,726; USPN 6,415,191) is directed to intelligent machining with associated speed and feed selection for a given tool, capable of handling changes in material or tool conditions, aided by neural networks.

Yoshida (USPN 6,438,445) is directed to a numerical control unit processor for using workpiece data, machining profile data, and sensors to predicatively determine and correct tool path planning including speed of the main spindle and the feed rate of the machine.

Sagawa (USPN 6,804,575; USPN 6,907,312) discloses a cutting-condition determination processing unit to generate machining programs based on cutting conditions determined based on cutting condition data from the type of material, the types of processes, and the types of tools.

Hill (US Patent Application Publication No. 2004/0179915) is directed to neural network dynamic control of a machining process.

Korn ("The Application of Multiparadigm Simulation Techniques to Manufacturing Process") discloses using neural networks, genetic algorithms, and fuzzy sets for the simulation and modeling of manufacturing processes such as peripheral milling, face milling, and end milling.

Liu ("Analytic Hierarchy Process Based Decision Modelling in CAPP Development Tools") states: "fuzzy inference, artificial neural nets and genetic algorithms in machining sequencing are well known".

Dereli ("Allocating optimal index positions on tool magazines using genetic algorithms") is directed to maximizing machining profits by using genetic algorithms in determining tool positions and indexing on ATC or turret magazine of CNC machine tools.

Park ("Generation and Evolutionary Learning of Cutting Conditions for Milling Operations") discloses evolutionary learning of cutting conditions for milling operations using fuzzy ARTMAP neural networks.

Ahmad ("Optimization of Process Planning Parameters for Rotational Components by Genetic Algorithms") is directed to using genetic algorithms to minimize machining time considering machining capacity limits in terms of the feed rate, depth of cut, cutting speed, etc.

Cus ("Genetic Algorithm Based Optimisation of End Milling Parameters") discloses determining optimal cutting conditions for a milling process using a genetic algorithm.

Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Benjamin J. Buss whose telephone number is 571-272-5831. The examiner can normally be reached on M-F 9AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Vincent can be reached on 571-272-3080. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Benjamin J Buss
Examiner
Art Unit 2129

BJB

1/28/06
DAVID VINCENT
SUPERVISORY PATENT EXAMINER